

PATENT ABSTRACTS OF JAPAN

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(21)Application number : 10-175870 (71)Applicant : MITSUBISHI HEAVY IND LTD

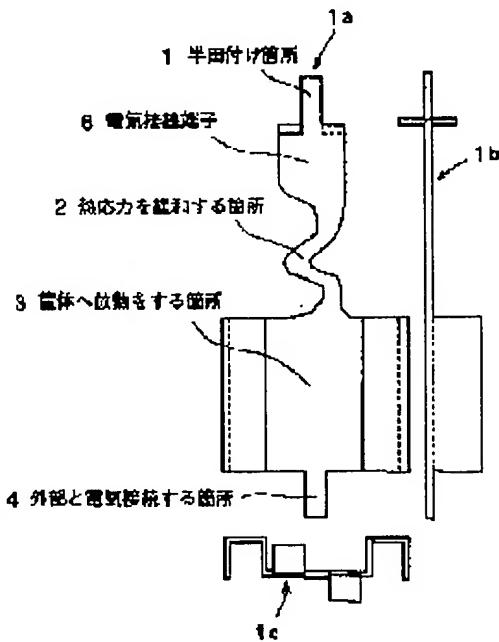
(22)Date of filing : 23.06.1998 (72)Inventor : GOTO KAZUSHI

(54) ELECTRIC CONNECTION TERMINAL

(57)Abstract:

PROBLEM TO BE SOLVED: To provide heat dissipating capability, further to relax heat stress, by providing a means internally connecting with at least one of a substrate wiring part and electronic components in the equipment, a means set in the case of the equipment for dissipating heat to the case, and a means penetrating the case to connect with the outside.

SOLUTION: This electric connection terminals 6 is composed of a flat part 1 soldered to a printed circuit board, a fin-shaped part 3 embedded in the bottom of a case, etc., to dissipate heat to the case, a flat part 4 connected to the outside, and a part 2 having elasticity of a spring structure formed by bending a flat plate and relaxing heat stress. The heat generated by semiconductor electronic components is conducted to the case through the printed circuit board, etc., by the electric connection terminal 6 mediating power to an in-vehicle electronics, etc., of a controller within a high-temperature engine room and input/output of electric signals, thereby a temperature rise is suppressed. This also prevents occurrence of solder cracks in the soldered part 1 caused by thermal expansion, etc., of the case.



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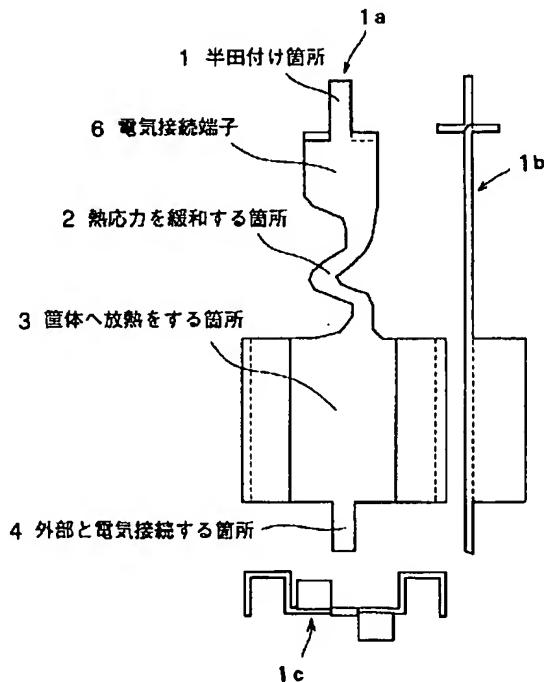
MM08 QQ04 RR07 RR31 RR49

(54)【発明の名称】 電気接続端子

(57)【要約】

【課題】放熱能力を有する電気接続端子を提供すること。

【解決手段】対象となる機器内の基板配線部及び電子部品の少なくとも一方と接続される内部接続手段(1)と、前記機器の筐体に設置され前記筐体に対して放熱を行なう放熱手段(3)と、前記筐体を貫通して外部と電気的に接続される外部接続手段(4)と、を具備。



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【特許請求の範囲】

【請求項1】対象となる機器内の基板配線部及び電子部品の少なくとも一方と接続される内部接続手段と、前記機器の筐体に設置され前記筐体に対して放熱を行なう放熱手段と、前記筐体を貫通して外部と電気的に接続される外部接続手段と、を具備したことを特徴とする電気接続端子。

【請求項2】対象となる機器内の基板配線部及び電子部品の少なくとも一方と接続される内部接続手段と、弾性を有し熱応力を緩和する熱応力緩和手段と、前記機器の筐体を貫通して外部と電気的に接続される外部接続手段と、を具備したことを特徴とする電気接続端子。

【請求項3】前記熱応力緩和手段は、平板を曲げたばね構造をなすことを特徴とする請求項2に記載の電気接続端子。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、車載用電子機器等に適用される電気接続端子に関する。

【0002】

【従来の技術】図6は、従来の車載用電子機器に適用される電気接続端子の構成を示す図であり、6aは正面図、6bは側面図、6cは平面図である。なお、車載用電子機器とは、例えば高温環境(115℃)のエンジルーム内に設置されるコントローラである。

【0003】図6に示す電気接続端子14はストレート形状をなしており、基板(不図示)と車載用電子機器の外部とを電気的に接続している。また、基板上で発生する熱は基板端から筐体(不図示)へ伝導する。

【0004】

【発明が解決しようとする課題】上述した従来の電気接続端子は、基板上で発生する熱が基板端から筐体へ伝導するものの、基板や電気接続端子で発生する熱の放熱と筐体の熱膨張等に起因する熱応力の緩和が行なえないという問題がある。すなわち、従来の電気接続端子は、基板と筐体とを密着させることができないため熱伝導性が良くなく、熱応力を緩和するための構造をなさないため、熱衝撃が繰り返されると端子と基板の半田付け箇所にクラックを発生するという問題がある。

【0005】本発明の第1の目的は、放熱能力を有する電気接続端子を提供することにある。

【0006】また本発明の第2の目的は、熱応力緩和能力を有する電気接続端子を提供することにある。

【0007】

【課題を解決するための手段】上記課題を解決し目的を達成するために、本発明の電気接続端子は以下の如く構成されている。

(1) 本発明の電気接続端子は、対象となる機器内の基

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板配線部及び電子部品の少なくとも一方と接続される内部接続手段と、前記機器の筐体に設置され前記筐体に対して放熱を行なう放熱手段と、前記筐体を貫通して外部と電気的に接続される外部接続手段と、から構成されている。

(2) 本発明の電気接続端子は、対象となる機器内の基板配線部及び電子部品の少なくとも一方と接続される内部接続手段と、弾性を有し熱応力を緩和する熱応力緩和手段と、前記機器の筐体を貫通して外部と電気的に接続される外部接続手段と、から構成されている。

(3) 本発明の電気接続端子は上記(2)に記載の電気接続端子であり、かつ平板を曲げたばね構造をなす。

【0008】

【発明の実施の形態】(第1の実施の形態)図1は、本発明の第1の実施の形態に係る電気接続端子の構成を示す全体図であり、1aは正面図、1bは側面図、1cは平面図である。

【0009】図1に示す電気接続端子6は車載用電子機器に適用され、平板状をなしプリント基板に半田付け接続をする半田付け箇所1、屈曲した平板状をなし、ばね構造により熱応力を緩和する箇所2、フィン形状をなし筐体へ放熱をする箇所3、及び平板状をなし車載用電子機器の外部と電気接続する箇所4により構成されている。なお、車載用電子機器とは、例えば高温環境(115℃)のエンジルーム内に設置されるコントローラである。

【0010】図2は、電気接続端子6が適用される車載用電子機器の設置場所の一例を示す図である。図2に示すように、車載用電子機器8はリレーボックス9内にリレー10と同様に実装される。

【0011】図3は、車載用電子機器8の構造の一例を示す図であり、(a)は斜視図、(b)は側断面図である。筐体7内において、電気接続端子6はプリント基板5を貫通し半田付け箇所1がプリント基板5に半田付けされており、筐体へ放熱をする箇所3が筐体7の底部に埋設されている。この電気接続端子6を介して、車載用電子機器8と外部との電気信号の入出力、及び車載用電子機器8への電源供給が行なわれる。プリント基板5上にはIC等の半導体電子部品13が実装されている。

【0012】半導体電子部品13により発生する熱は、プリント基板5上の銅箔配線パターン12とプリント基板5を通じて、電気接続端子6へ伝導する。電気接続端子6に伝導した熱は、電気接続端子6における筐体へ放熱する箇所3を介して筐体7へ伝導する。

【0013】図1における熱応力を緩和する箇所2は、図3の(b)に示すプリント基板5と筐体7底部とのなす空間にあり、エンジルーム内における高温時に筐体7の熱膨張等によりプリント基板5の半田付け箇所1に熱応力が発生することを、平板を曲げたばね構造の弾性により緩和するため、半田付け箇所1に半田クラックが

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生じにくい。また、筐体7へ放熱をする箇所3は、プリント基板5及び電気接続端子6に流れる電流により発生するジュール熱を筐体7へ伝導するため、プリント基板5及び半導体電子部品13の温度上昇を緩和することができる。

【0014】(第2の実施の形態)図4は、本発明の第2の実施の形態に係る電気接続端子の構成を示す全体斜視図である。

【0015】図4に示す電気接続端子61は車載用電子機器に適用され、プリント基板に半田付け接続をする半田付け箇所11、屈曲した平板状をなし熱応力を緩和する箇所21、平板状をなし筐体へ放熱をする箇所31、及び車載用電子機器の外部と電気接続する箇所41により構成されている。なお、車載用電子機器とは、例えば高温環境(115°C)のエンジルーム内に設置されるコントローラである。

【0016】図5は、電気接続端子61が適用される車載用電子機器81の構造の一例を示す斜視断面図である。図5において図3と同一な部分には同一符号を付してある。電気接続端子61はプリント基板5を貫通し半田付け箇所1がプリント基板5に半田付けされており、筐体へ放熱をする箇所3が筐体7の底部に埋設されている。この電気接続端子61を介して、車載用電子機器81と外部との電気信号の入出力、及び車載用電子機器81への電源供給が行なわれる。プリント基板5上にはIC等の半導体電子部品13が実装されている。

【0017】半導体電子部品13により発生する熱は、プリント基板5上の銅箔配線パターン12とプリント基板5を通じて、電気接続端子6へ伝導する。電気接続端子6に伝導した熱は、電気接続端子6における筐体7へ放熱する箇所3を介して筐体7へ伝導する。

【0018】図4における熱応力を緩和する箇所2は、図5に示すプリント基板5と筐体7底部とのなす空間にあり、エンジルーム内における高温時に筐体7の熱膨張によりプリント基板5の半田付け箇所1に熱応力が発生することをばね性により緩和するため、半田付け箇所1に半田クラックが生じにくい。また、筐体7へ放熱をする箇所3は、プリント基板5及び電気接続端子6に流れる電流により発生するジュール熱を筐体7へ伝導するため、プリント基板5及び半導体電子部品13の温度上昇を緩和することができる。

【0019】なお、本発明は上記各実施の形態のみに限定されず、要旨を変更しない範囲で適宜変形して実施できる。

【0020】(実施の形態のまとめ)実施の形態に示された構成及び作用効果をまとめると次の通りである

【1】実施の形態に示された電気接続端子は、対象となる機器(8, 81)内の基板配線部(12)及び電子部品(13)の少なくとも一方と接続される内部接続手段(1, 11)と、前記機器(8, 81)の筐体7に設置

され前記筐体7に対して放熱を行なう放熱手段(3, 31)と、前記筐体7を貫通して外部と電気的に接続される外部接続手段(4, 41)と、から構成されている。

【0021】このように上記電気接続端子によれば、基板5との接続箇所を面で接触させ熱伝導性に優れた構造をなし、放熱能力を有するため、基板5及び半導体電子部品13で発生した熱を効率良く筐体へ放熱することができる。

【2】実施の形態に示された電気接続端子は、対象となる機器(8, 81)内の基板配線部(12)及び電子部品(13)の少なくとも一方と接続される内部接続手段(1, 11)と、弾性を有し熱応力を緩和する熱応力緩和手段(2, 21)と、前記機器(8, 81)の筐体7を貫通して外部と電気的に接続される外部接続手段(4, 41)と、から構成されている。

【0022】このように上記電気接続端子によれば、筐体7の熱膨張等による熱応力の緩和能力を有する。

【3】実施の形態に示された電気接続端子は上記【2】に記載の電気接続端子であり、かつ前記熱応力緩和手段(4, 41)は、平板を曲げたばね構造をなす。

【0023】このように上記電気接続端子によれば、熱応力を平板を曲げたばね構造により緩和することで、半田付け箇所1に半田クラックが生じにくくなる。

【0024】

【発明の効果】本発明によれば、下記の電気接続端子を提供できる。

- (1)放熱能力を有する電気接続端子。
- (2)熱応力緩和能力を有する電気接続端子。

【図面の簡単な説明】

【図1】本発明の第1の実施の形態に係る電気接続端子の構成を示す全体図。

【図2】本発明の第1の実施の形態に係る車載用電子機器の設置場所の一例を示す図。

【図3】本発明の第1の実施の形態に係る車載用電子機器の構造の一例を示す図。

【図4】本発明の第2の実施の形態に係る電気接続端子の構成を示す全体斜視図。

【図5】本発明の第2の実施の形態に係る車載用電子機器の構造の一例を示す斜視断面図。

【図6】従来例に係る電気接続端子の構成を示す図。

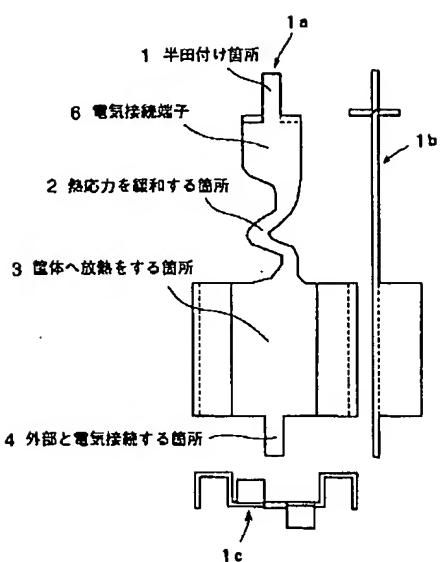
【符号の説明】

- 1, 11…半田付け箇所
- 2, 21…熱応力を緩和する箇所
- 3, 31…筐体へ放熱をする箇所
- 4, 41…外部と電気接続する箇所
- 5…プリント基板
- 6, 61…電気接続端子
- 7…筐体
- 8, 81…車載用電子機器
- 9…リレーボックス

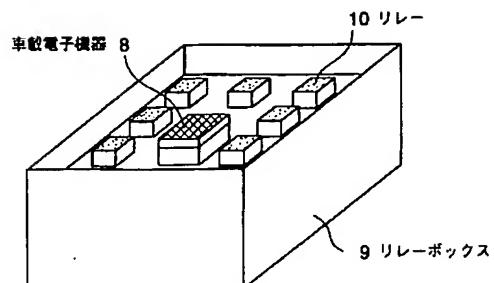
10…リレー
12…銅箔配線パター

13…半導体電子部品

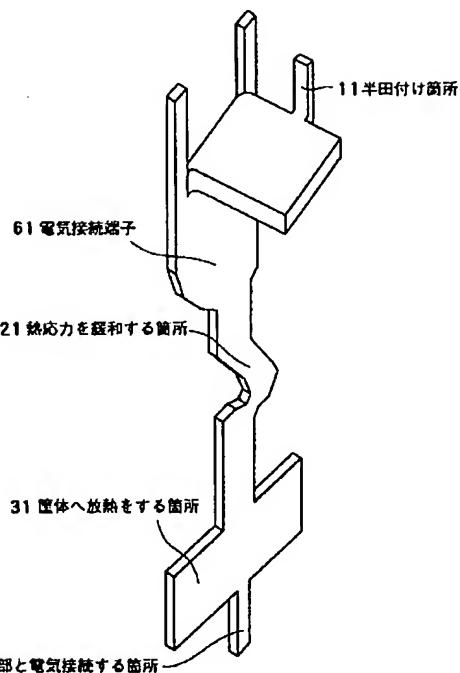
【図1】



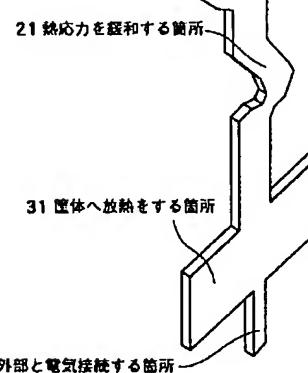
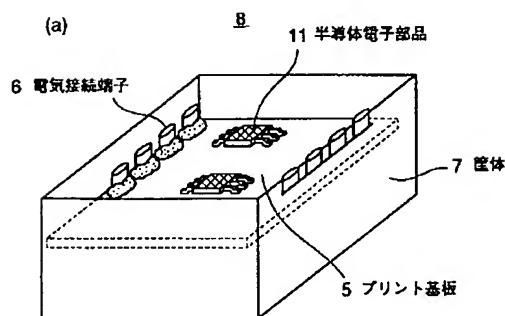
【図2】



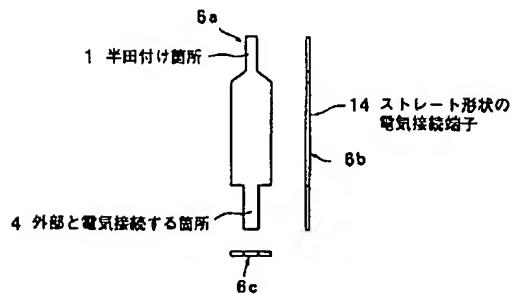
【図4】



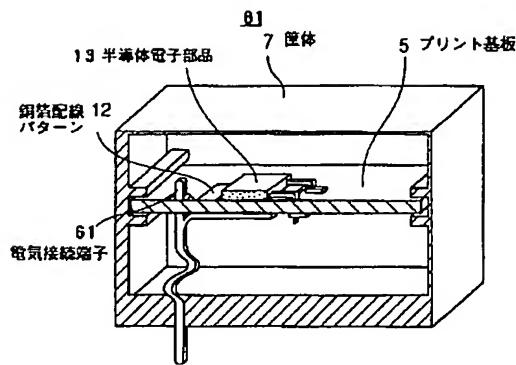
【図3】



【図6】



【図5】



PAT-NO: JP02000012112A
DOCUMENT-IDENTIFIER: JP 2000012112 A
TITLE: ELECTRIC CONNECTION TERMINAL

PUBN-DATE: January 14, 2000

INVENTOR-INFORMATION:

NAME	COUNTRY
GOTO, KAZUSHI	N/A

ASSIGNEE-INFORMATION:

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APPL-NO: JP10175870

APPL-DATE: June 23, 1998

INT-CL (IPC): H01R004/58 , H01R013/533

ABSTRACT:

PROBLEM TO BE SOLVED: To provide heat dissipating capability, further to relax heat stress, by providing a means internally connecting with at least one of a substrate wiring part and electronic components in the equipment, a means set in the case of the equipment for dissipating heat to the case, and a means penetrating the case to connect with the outside.

SOLUTION: This electric connection terminals 6 is composed of a flat part 1 soldered to a printed circuit board, a fin-shaped part 3 embedded in the bottom of a case, etc., to dissipate heat to the case, a flat part 4 connected to the outside, and a part 2 having elasticity of a spring structure formed by bending a flat plate and relaxing heat stress. The heat generated by semiconductor electronic components is conducted to the case through the printed circuit board, etc., by the electric connection terminal 6 mediating power to an in-vehicle electronics, etc., of a controller within a high-temperature engine room and input/output of electric signals, thereby

a temperature rise is suppressed. This also prevents occurrence of solder cracks in the soldered part 1 caused by thermal expansion, etc., of the case.

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CLAIMS

[Claim(s)]

[Claim 1] The electrical connection terminal characterized by providing the internal connection means connected to either [at least] the substrate wiring section in the target device, or electronic parts, the heat dissipation means which is installed in the case of said device and radiates heat to said case, and the external connecting means which penetrates said case and is electrically connected with the exterior.

[Claim 2] The electrical connection terminal characterized by providing the internal connection means connected to either [at least] the substrate wiring section in the target device, or electronic parts, a thermal stress relaxation means to have elasticity and to ease thermal stress, and the external connecting means which penetrates the case of said device and is electrically connected with the exterior.

[Claim 3] Said thermal stress relaxation means is an electrical connection terminal according to claim 2 characterized by making the spring structure which bent the plate.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the electrical connection terminal applied to the electronic equipment for mount etc.

[0002]

[Description of the Prior Art] Drawing 6 is drawing showing the configuration of the electrical connection terminal applied to the conventional electronic equipment for mount, and 6a is [a side elevation and 6c of a front view and 6b] top views. In addition, the electronic equipment for mount is a controller installed in the engine room of hot environments (115 degrees C).

[0003] The electrical connection terminal 14 shown in drawing 6 is making the straight configuration, and has connected electrically a substrate (un-illustrating) and the exterior of the electronic equipment for mount. Moreover, the heat generated on a substrate is conducted from a substrate edge to a case (un-illustrating).

[0004]

[Problem(s) to be Solved by the Invention] Although the heat generated on a substrate conducts the conventional electrical connection terminal mentioned above from a substrate edge to a case, it has the problem that thermal stress resulting from heat dissipation of heat, thermal expansion of a case, etc. which are generated with a substrate or an electrical connection terminal cannot be eased. That is, in order that the conventional electrical connection terminal may not make structure for thermal conductivity to ease thermal stress well since a substrate and a case cannot be stuck, when a thermal shock is repeated, the problem of generating a crack is in the soldering part of a terminal and a substrate.

[0005] The 1st purpose of this invention is to offer the electrical connection terminal which has heat dissipation capacity.

[0006] Moreover, the 2nd purpose of this invention is to offer the electrical connection terminal which has thermal stress relaxation capacity.

[0007]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem and to attain the purpose, the electrical connection terminal of this invention is constituted as the following.

(1) an internal connection means by which the electrical connection terminal of this invention is connected to either [at least] the substrate wiring section in the target device, or electronic parts, the heat dissipation means which is installed in the case of said device and radiates heat to said case, and the external connecting means which penetrates said case and is electrically connected with the exterior -- since -- it is constituted.

(2) an internal connection means by which the electrical connection terminal of this invention is connected to either [at least] the substrate wiring section in the target device, or electronic parts, a thermal stress relaxation means to have elasticity and to ease thermal stress, and the external connecting means that penetrates the case of said device and is electrically connected with the exterior -- since -- it

is constituted.

(3) The electrical connection terminal of this invention makes the spring structure which is an electrical connection terminal given in the above (2), and bent the plate.

[0008]

[Embodiment of the Invention] (Gestalt of the 1st operation) Drawing 1 is the general drawing showing the configuration of the electrical connection terminal concerning the gestalt of operation of the 1st of this invention, and 1a is [a side elevation and 1c of a front view and 1b] top views.

[0009] The electrical connection terminal 6 shown in drawing 1 is applied to the electronic equipment for mount, and is constituted by the soldering part 1 which makes soldering connection for plate-like to a nothing printed circuit board, the part 2 which eases thermal stress for plate-like [which was crooked] according to nothing and spring structure, the part 3 which radiates heat to a nothing case in a fin configuration, and the part 4 which carries out electrical connection of plate-like to the exterior of the electronic equipment for nothing mount. In addition, the electronic equipment for mount is a controller installed in the engine room of hot environments (115 degrees C).

[0010] Drawing 2 is drawing showing an example of the installation of the electronic equipment for mount by which the electrical connection terminal 6 is applied. As shown in drawing 2, the electronic equipment 8 for mount is mounted like relay 10 in a relay box 9.

[0011] Drawing 3 is drawing showing an example of the structure of the electronic equipment 8 for mount, (a) is a perspective view and (b) is a sectional side elevation. The electrical connection terminal 6 penetrates a printed circuit board 5 in a case 7, and the part 3 where the soldering part 1 is soldered to the printed circuit board 5, and radiates heat to a case is laid under the pars basilaris ossis occipitalis of a case 7. I/O of the electrical signal of the electronic equipment 8 for mount and the exterior and current supply to the electronic equipment 8 for mount are performed through this electrical connection terminal 6. On the printed circuit board 5, the semi-conductor electronic parts 13, such as IC, are mounted.

[0012] The heat generated with the semi-conductor electronic parts 13 is conducted to the electrical connection terminal 6 through the copper foil circuit pattern 12 and printed circuit board 5 on a printed circuit board 5. The heat conducted for the electrical connection terminal 6 is conducted to a case 7 through the part 3 which radiates heat to the case in the electrical connection terminal 6.

[0013] The part 2 which eases the thermal stress in drawing 1 is located in the space of the printed circuit board 5 shown in (b) of drawing 3, and case 7 pars basilaris ossis occipitalis to make, and since it eases with the elasticity of the spring structure which bent the plate, a solder crack cannot produce easily that thermal stress occurs in the soldering part 1 of a printed circuit board 5 by the thermal expansion of a case 7 etc. at the time of the elevated temperature in an engine room in the soldering part 1. Moreover, since the part 3 which radiates heat to a case 7 conducts the Joule's heat generated according to the current which flows for a printed circuit board 5 and the electrical connection terminal 6 to a case 7, it can ease the temperature rise of a printed circuit board 5 and the semi-conductor electronic parts 13.

[0014] (Gestalt of the 2nd operation) Drawing 4 is the whole perspective view showing the configuration of the electrical connection terminal concerning the gestalt of operation of the 2nd of this invention.

[0015] The electrical connection terminal 61 shown in drawing 4 is applied to the electronic equipment for mount, and is constituted by the part 41 which carries out electrical connection of the soldering part 11 which makes soldering connection to a printed circuit board, the part 21 which eases nothing thermal stress for plate-like [which was crooked], and plate-like to the exterior of the part 31 which radiates heat to a nothing case, and the electronic equipment for mount. In addition, the electronic equipment for mount is a controller installed in the engine room of hot environments (115 degrees C).

[0016] Drawing 5 is the strabismus sectional view showing an example of the structure of the electronic equipment 81 for mount where the electrical connection terminal 61 is applied. In drawing 5, the same sign is given to the same part as drawing 3. The electrical connection terminal 61 penetrates a printed circuit board 5, and the part 3 where the soldering part 1 is soldered to the printed circuit board 5, and radiates heat to a case is laid under the pars basilaris ossis occipitalis of a case 7. I/O of the electrical signal of the electronic equipment 81 for mount and the exterior and current supply to the electronic

equipment 81 for mount are performed through this electrical connection terminal 61. On the printed circuit board 5, the semi-conductor electronic parts 13, such as IC, are mounted.

[0017] The heat generated with the semi-conductor electronic parts 13 is conducted to the electrical connection terminal 6 through the copper foil circuit pattern 12 and printed circuit board 5 on a printed circuit board 5. The heat conducted for the electrical connection terminal 6 is conducted to a case 7 through the part 3 which radiates heat to the case 7 in the electrical connection terminal 6.

[0018] The part 2 which eases the thermal stress in drawing 4 is located in the space of the printed circuit board 5 shown in drawing 5, and case 7 pars basilaris ossis occipitalis to make, and since it eases by spring nature that thermal stress occurs in the soldering part 1 of a printed circuit board 5 by the thermal expansion of a case 7 at the time of the elevated temperature in an engine room, a solder crack cannot produce it easily in the soldering part 1. Moreover, since the part 3 which radiates heat to a case 7 conducts the Joule's heat generated according to the current which flows for a printed circuit board 5 and the electrical connection terminal 6 to a case 7, it can ease the temperature rise of a printed circuit board 5 and the semi-conductor electronic parts 13.

[0019] In addition, this invention is not limited only to the gestalt of each above-mentioned implementation, but in the range which does not change a summary, deforms suitably and can be carried out.

[0020] (Conclusion of the gestalt of operation) The electrical connection terminal shown in the gestalt of [1] operation which is as follows when the configuration and the operation effectiveness which were shown in the gestalt of operation were summarized The internal connection means connected to either [at least] the substrate wiring section (12) in the target device (8 81), or electronic parts (13) (1 11), the heat dissipation means (3 31) which is installed in the case 7 of said device (8 81), and radiates heat to said case 7, and the external connecting means (4 41) which penetrates said case 7 and is electrically connected with the exterior -- since -- it is constituted.

[0021] Thus, according to the above-mentioned electrical connection terminal, heat can be efficiently radiated to a case in the heat which generated the structure which contacted the connection place with a substrate 5 in the field, and was excellent in thermal conductivity with a substrate 5 and the semi-conductor electronic parts 13 since it had nothing and heat dissipation capacity.

[2] The electrical connection terminal shown in the gestalt of operation The internal connection means connected to either [at least] the substrate wiring section (12) in the target device (8 81), or electronic parts (13) (1 11), a thermal stress relaxation means (2 21) to have elasticity and to ease thermal stress, and the external connecting means (4 41) which penetrates the case 7 of said device (8 81), and is electrically connected with the exterior -- since -- it is constituted.

[0022] Thus, according to the above-mentioned electrical connection terminal, it has the relaxation capacity of the thermal stress by the thermal expansion of a case 7 etc.

[3] The electrical connection terminal shown in the gestalt of operation is an electrical connection terminal given in the above [2], and said thermal stress relaxation means (4 41) makes the spring structure which bent the plate.

[0023] Thus, according to the above-mentioned electrical connection terminal, a solder crack stops being able to produce thermal stress easily in the soldering part 1 due to easing according to the spring structure which bent the plate.

[0024]

[Effect of the Invention] According to this invention, the following electrical connection terminal can be offered.

- (1) The electrical connection terminal which has heat dissipation capacity.
- (2) The electrical connection terminal which has thermal stress relaxation capacity.

[Translation done.]

* NOTICES *

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damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] General drawing showing the configuration of the electrical connection terminal concerning the gestalt of operation of the 1st of this invention.

[Drawing 2] Drawing showing an example of the installation of the electronic equipment for mount concerning the gestalt of operation of the 1st of this invention.

[Drawing 3] Drawing showing an example of the structure of the electronic equipment for mount concerning the gestalt of operation of the 1st of this invention.

[Drawing 4] The whole perspective view showing the configuration of the electrical connection terminal concerning the gestalt of operation of the 2nd of this invention.

[Drawing 5] The strabism sectional view showing an example of the structure of the electronic equipment for mount concerning the gestalt of operation of the 2nd of this invention.

[Drawing 6] Drawing showing the configuration of the electrical connection terminal concerning the conventional example.

[Description of Notations]

1 11 -- Soldering part

2 21 -- Part which eases thermal stress

3 31 -- Part which radiates heat to a case

4 41 -- Part which carries out electrical connection to the exterior

5 -- Printed circuit board

6 61 -- Electrical connection terminal

7 -- Case

8 81 -- Electronic equipment for mount

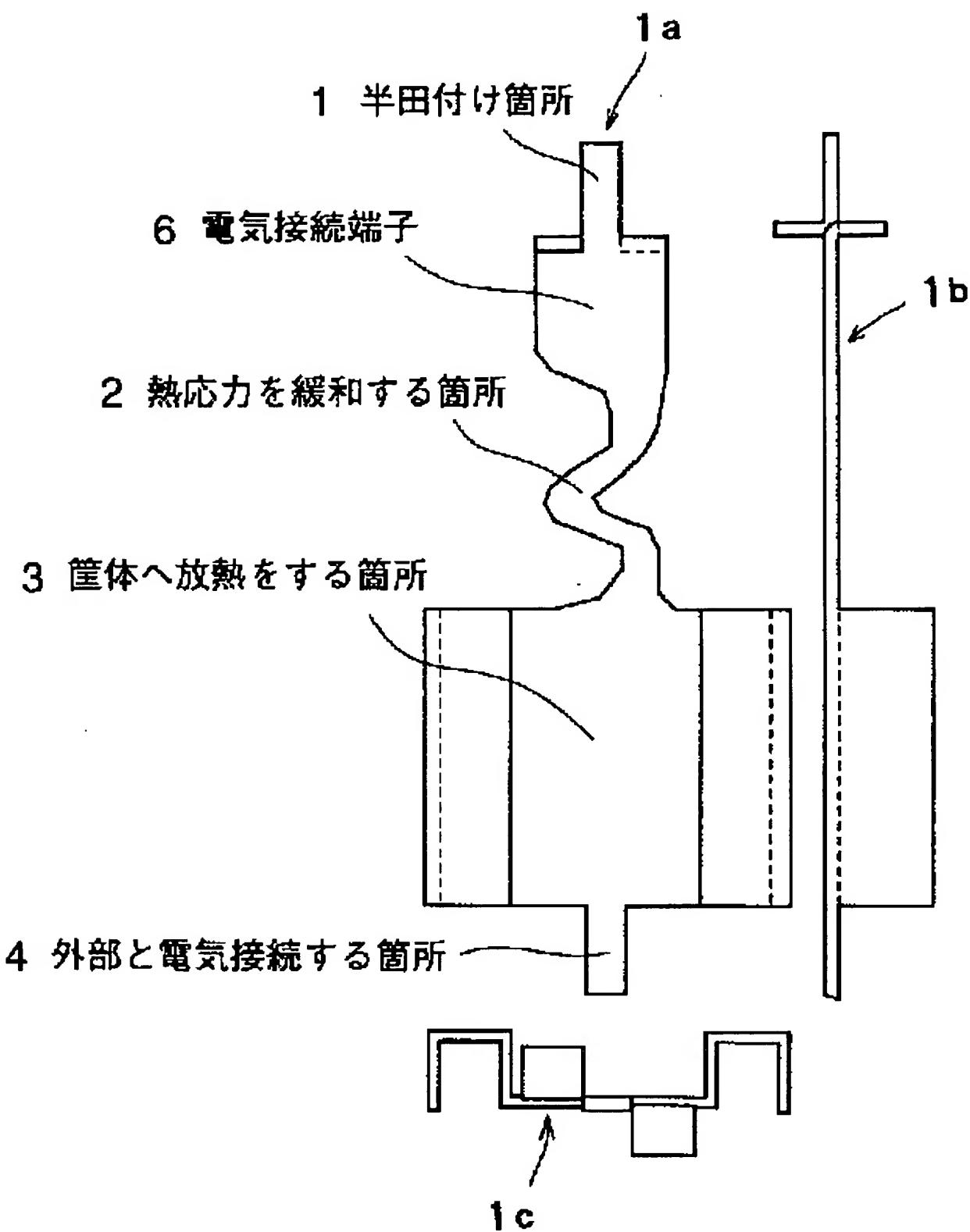
9 -- Relay box

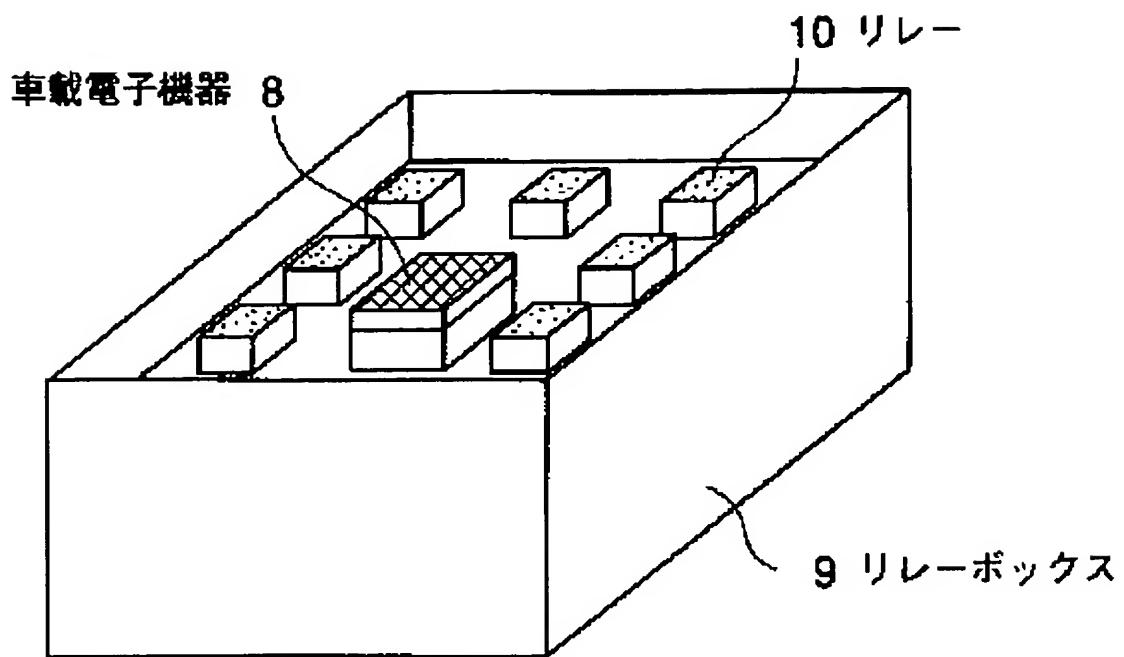
10 -- Relay

12 -- Copper foil circuit pattern

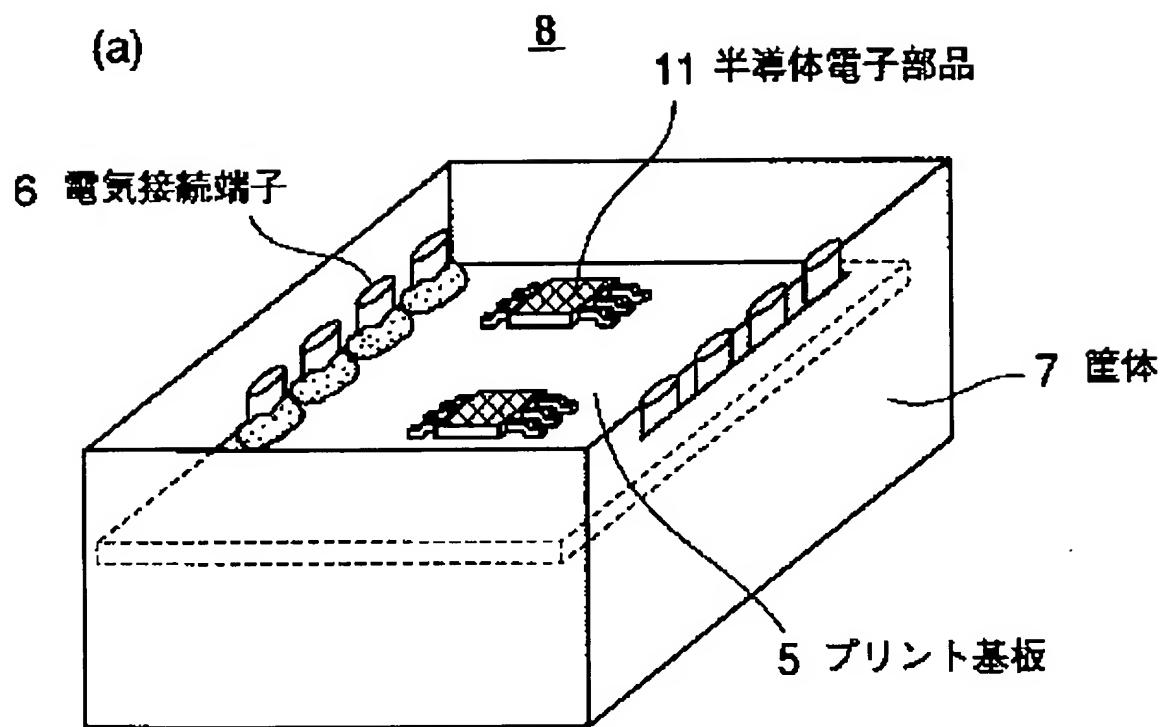
13 -- Semi-conductor electronic parts

[Translation done.]





(a)



(b)

